Application No.: 10/019,407   Docket No.: 520.41003X00

REMARKS

Reconsideration and allowance of this application, as amended, is respectfully requested.

This Amendment is in response to the Office Action dated April 8, 2004

Regarding the Office Action, appreciation is expressed for the indication of allowable subject matter in claims 14 and 15. Regarding this, it is noted that it is stated that these claims would be allowable "if rewritten into independent form including all limitations of the base claim and any intervening claims." However, claim 14 is already in independent form, with claim 15 being dependent on claim 14. Therefore, allowance of claims 14 and 15 is respectfully requested. It is noted that a minor amendment has been made to claim 14 for clarification, but this does not effect the substance of the claim.

Also by the present Amendment, other minor amendments have been made for clarification of the claim language. In addition, claim 7 has been canceled and claim 8 has been rewritten into independent form to place it in condition for allowance for reasons discussed below.

By virtue of the present Amendment, all of the pending claims in the application define a feature of the invention (or depend from a claim defining the feature) concerning the location of "crystal grains with the number of closest crystal grains of 6." For example, in claims 1 and 3, the location of these crystal grains is defined as being greatest among the plural crystal grains that form the polycrystalline semiconductor thin film. Independent claim 5 defines this somewhat more specifically in terms of a square region with a 10μ side, in which 50 to 100% of the crystal grains have the number of closest crystalline grains of 6 within an area that

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includes the center of the polycrystalline semiconductor thin film. Claim 16, on the other hand, defines the location of these grains within the channel region of the transistor.

The significance of the crystal grains having the number of <u>closest</u> crystalline grains of 6 is perhaps best understood by studying Fig. 6 and the description found on page 19 beginning with the first full paragraph:

> "N is a number of closest crystal grains for an optional crystal grain."

As indicated in Fig. 6(a) through 6(c) and the discussion on pages 19 and 20, the meaning of "closest crystal grains" for an optional crystal grain is the number of crystal grains which are immediately adjacent to the optional crystal grain. Referring to Fig. 9(a), for example, it can be seen that the number of closest crystal grains to the optional center grain would be 7. In Fig. 9(b), on the other hand, the number would be 6. From the Applicants' studies, as discussed beginning on page 21 for Fig. 8(b) and Figs. 9(a) and 9(b), Applicants have found that very suitable results can be obtained by using laser beam irradiation repeatedly with a suitable shape selection laser energy density Ec (e.g., Fig. 6(c)) to form have the number of closest crystalline grains of 6 crystal grains for about 50 to 100% of the crystal grains within the polycrystalline silicon film. (See particularly the last eight lines of page 21 and the first six lines of page 22). Thus, for example, the expression "the number of crystal grains with the number of closest crystal grains of 6" set forth in each of the independent claims pending in the present application relates to crystal grains such as the "optional crystal grain" described on page 19 of the specification which will have 6 "closest crystal grains", such as shown in Fig. 9(b).

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Reconsideration and allowance of claims 1-6, 8-13 and 16-20, together with already allowed claims 14 and 15, over the cited prior art to Yamazaki, either alone or in combination with Kusumoto, is respectfully requested.

In the Office Action, it is stated that Yamazaki meets the claim limitation of "wherein in which the number of crystal grains the number of closest crystal grains of 6 is greatest among plural crystal grains that form the polycrystalline semiconductor thin film," referring to column 8, line 25-45 and Fig. 2A of Yamazaki. However, it is respectfully submitted that the statement in the Office Action regarding Yamazaki confuses the difference between "the number of crystal grains" and "the number of crystal grains with the number of closest crystal grains of 6". In other words, in Fig. 2A of Yamazaki, 6 crystal grains A-F are shown around a vertical growth nuclei region 201. However, each of the actual crystal grain regions A-F themselves are triangular shaped grains, formed by lateral growth, which would actually only have a number of closest crystal grains of 3. In other words, for each of the individual substantially triangular grains A-F, the number of closest crystal grains adjacent thereto would be 3.

The significance of the difference between the present invention and Yamazaki can be appreciated, for example, by comparing Fig. 9(b) of the present invention with Fig. 2A of Yamazaki. In Fig. 9(b) of the present invention, a central "optional crystal grain" 251 is bounded by other crystal grains 251 such that the central crystal grain 251 will have 6 closest crystal grains. This is not the case for Fig. 2A of Yamazaki since the actual crystal grains themselves A-F are triangular. The "vertical growth region" 201, on the other hand, is described in column 8, line 34 et seq. as follows:

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"Because the vertical growth region 201 in the present
embodiment <u>can be regarded as points</u>, the lateral growth region 202
is obtained in an approximately hexagonal shape."

The vertical growth region 201 itself <u>is not</u> a crystal grain corresponding to the other crystal grains A-F. In other words, in Fig. 9(b) of the present application, the central "optional" crystal grain region 251 is itself a crystal grain region similar to the surrounding crystal grain regions 251. This is quite different from the structure shown in Fig. 2A and described in column 8 of Yamazaki where a "point" vertical growth region 201 is surrounded by triangular grain regions A-F. Therefore, it is respectfully submitted that Yamazaki lacks this critical feature of "the number of crystal grains with the number of closest crystal grains of 6" defined in each of the independent claims. Therefore, reconsideration and allowance of each of these independent claims 1, 3, 5, 8, 10, 16, 17 and 19 is respectfully requested.

If the Examiner believes that there are any other points which may be clarified or otherwise disposed of either by telephone discussion or by personal interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus,

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LLP Deposit Account No. 01-2135 (Docket No. 520.41003X00), and please credit

any excess fees to such Deposit Account.

Respectfully submitted,

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